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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

ILLUMINA, INC., and
ILLUMINA CAMBRIDGE LTD.,

Plaintiffs,

v.

BGI GENOMICS CO., LTD.,
BGI AMERICAS CORP.,
MGI TECH CO., LTD.,
MGI AMERICAS, INC., and
COMPLETE GENOMICS INC.,

Defendants.

COMPLETE GENOMICS INC.,

Counterclaim-Plaintiff,

v.

ILLUMINA, INC., and
ILLUMINA CAMBRIDGE LTD.,

Counterclaim-Defendants

Case No. 3:19-cv-03770-WHO

DECLARATION OF KEVIN BURGESS IN SUPPORT OF PLAINTIFFS ILLUMINA, INC. AND ILLUMINA CAMBRIDGE LTD.'S MOTION FOR PRELIMINARY INJUNCTION

Date: March 25, 2020
Time: 2:00 p.m.
Courtroom: 2, 17th Floor

Hon. William H. Orrick

1. I, Kevin Burgess, Ph.D., have been retained by Plaintiffs Illumina and Illumina Cambridge, Ltd. (collectively "Illumina") to offer opinions regarding infringement and validity of U.S. Pat. No. 7,566,537 ("the '537 patent") and U.S. Pat. No. 9,410,200 ("the '200 patent") (collectively, "the Asserted Illumina Patents").

I have been asked by counsel for Plaintiffs to provide opinions regarding infringement of claims 1, 3-6 and 8 of the '537 patent and claims 1, 4-5, 7-11, 14-15 and 17-19 of the '200 patent (collectively, the "Identified Claims") by MGI's sequencer instruments, including but not limited to the MGISEQT7, DNBSEQ-G400 (previously known as the MGISEQ-2000), DNBSEQ-G50 (previously known as the MGISEQ-200), BGISEQ-500, and BGISEQ-50 (all of which include the MGI sequencer instrument, the sequencer instrument software, and the sequencer instrument computer workstation), and the reagents that are used in conjunction with the MGI Sequencers for their intended purpose of DNA sequencing (collectively, the "Accused Products").

2. This report is based on information currently available to me. I may continue my investigation and study as new information comes to light and circumstances evolve. Accordingly, I may supplement my opinions and/or provide rebuttal opinions. I would be able to testify regarding the matters stated in this report, if asked by the Court or by the parties' attorneys.

I. SUMMARY OF OPINIONS

3. It is my opinion that MGI directly infringes the Identified Claims.

II. BACKGROUND AND QUALIFICATIONS

4. I am currently a Rachal Professor of Chemistry at Texas A&M University with specialization in asymmetric syntheses and synthetic organic chemistry as it relates to medicinal chemistry and problems of importance to biotechnology.

5. I obtained (1) a Bachelor of Science Degree at the University of Bath in Bath, England, where I received the Bachelor of Science prize, in 1979; (2) a Masters Degree in Physical Organic Chemistry at the University of East Anglia in Norwich, England, where I received the Master of Science prize, in 1980; and (3) a Doctor of Philosophy (Ph.D.) Degree in Organometallic Chemistry at the University of Cambridge in Cambridge, England, where I studied reactions of 1,3 Dipolar Compounds, in 1983.

6. I received the Sir Henry Stracosh Travel Grant, Fulbright Travel Award, Research Lectureship at Christ Church in Oxford in 1984 and Junior Research Fellowship at Girton College in Cambridge in 1985.

7. Before being named as a Professor at Texas A & M University, I was a Postdoctoral Fellow at the University of Wisconsin in Madison, Wisconsin, from 1983 to 1984 (Fulbright Travel Awardee to take up this position); a Research Fellow at the University Chemical Laboratory in Cambridge, England, from 1984 to 1987; an Assistant Professor of Organic Chemistry at William Marsh Rice University from 1986 to 1992; and an Associate Professor at Texas A & M University from 1992 to 1996.

8. I have co-authored the "Highlights" section in Chemistry and Industry since 1986. Currently, I write the "Biomedical Chemistry" section for that column.

9. I have over 330 publications, including, significantly, several papers on sequencing by synthesis, and at least two patents. My H-index (a measure of the impact of my published work with respect to citations) was approximately 70 as of December 2020. An H-index of 70 means that I have 70 publications that have been cited in the literature at least 70 times.

10. I have consulted for biotechnology company Gradalis, L'Oreal (Paris), Southwestern Medical Center (Dallas), Combinix (CA, USA), Proctor and Gamble Pharmaceuticals Division (Cincinnati), LaserGen (Houston), ISIS Pharmaceuticals (CA USA), Protein Design Laboratories (CA, USA) Boehringer Ingelheim (CT, USA), and Houghten Pharmaceuticals (CA, USA). My consulting work with LaserGen and ISIS involved nucleotides, nucleosides, or DNA sequencing.

11. I was the U.S. regional editor for the journal Tetrahedron Asymmetry for several years.

12. In 2013, I was awarded the Pedler Award by The Royal Society of Chemistry for contributions to organic chemistry by a professor under the age of 55. I was also made a Fellow of the Royal Society of Chemistry.

13. I received the Humboldt Research Fellowship Award in 2016.

14. My expertise, professional experience, and qualifications are further detailed in my

Curriculum Vitae, a copy of which is submitted herewith as Ex. A.

15. The following is a list of all other cases in which, during the previous four years (or longer), I have testified as an expert at trial or by deposition:

- *Pfizer v. Mylan Labs. et al.*, No. 02-1628, Western District of Pennsylvania.
- *Sanofi-Aventis U.S. LLC, et al., v, Fresenius Kabi Oncology PLC, et al.*, No. 07-02854, District of New Jersey.
- *Aventis Pharma, S.A. et al., v. Dabur Pharma, LTD.*, in the Republic of the Philippines, Regional Trial Court, Civil Case No. 06-747.
- *Sanofi-Aventis (Malaysia) SDN BHD et al., v. Fresenius Kabi (Malaysia) SDN BHD et al.*, in the Republic of Malaysia, High Court of Malaya, Case No. D-22IP-46.
- *In re: NEXIUM (ESOMEPRAZOLE) ANTITRUST LITIGATION*
- Proceedings IPR2012-00006, IPR2012-00007, IPR2013-00011, and IPR2013-00517 in the U.S. Patent and Trademark Office.

16. The complete list of all publications authored by me is provided in my Curriculum Vitae. Ex. A.

17. I have no financial interest in this proceeding, and my compensation is unaffected by the content of my testimony or the outcome of this proceeding.

III. LEGAL STANDARD

18. I am not a legal expert and offer no opinions of the law. However, I have been informed by counsel of the legal standards that apply with respect to determining infringement.

19. I have been informed that the specification of a patent includes the written description of one or more preferred embodiments of the invention, drawings, and figures, as well as one or more claims that point out and claim the subject matter of the invention. The claims define and measure the patent's scope. Each claim defines a separate invention.

20. I have been informed that a dependent claim incorporates each and every element of the claim from which it depends.

21. I have been informed that the determination of infringement is a two-step process. First, the language of the claims asserted against a device, method or structure accused of

infringement, which I will refer to as the "accused" device, method or structure, is construed by the Court. Second, the accused device, method or structure is compared to the construed claim.

22. I have been informed that literal infringement is found when each and every element of at least one of the patent's claims, under the Court's construction, is literally found or practiced in the accused device, method or structure. My understanding of the law with respect to patent infringement is that an accused device, method or structure infringes a claim if it contains all the elements of the claim, regardless of whether or not there are additional elements in the accused device, method or structure not present in the claim.

23. I have been informed that the burden of proof for proving patent infringement is by a preponderance of the evidence, which standard means that the accused device is established to be more likely to infringe than not to infringe a claim of the patents-in-suit.

IV. TECHNOLOGY BACKGROUND

24. The Asserted Illumina Patents generally relate to modified nucleotides, techniques for labeling nucleic acid molecules, and methods of determining nucleic acid sequences. First I will discuss the asserted claims of the '537 patent, followed by a similar discussion of the '200 patent.

25. Independent claim 1 of the '537 patent pertains to the use of a specific kind of modified nucleotides for labeling a nucleic acid molecule, and appears in full below:

> 1. A method of labeling a nucleic acid molecule, the method comprising incorporating into the nucleic acid molecule a nucleotide or nucleoside molecule, wherein the nucleotide or nucleoside molecule has a base that is linked to a detectable label via a cleavable linker and the nucleotide or nucleoside molecule has a ribose or deoxyribose sugar moiety, wherein the ribose or deoxyribose sugar moiety comprises a protecting group attached via the 2′ or 3′ oxygen atom, and said protecting group can be modified or removed to expose a 3′ OH group and the protecting group comprises an azido group.

Ex. B ('537 patent) at 19:49-59.

26. Briefly, the claim describes a technique for determining the sequence of a nucleic acid molecule, such as a DNA molecule, by incorporating into the nucleic acid molecule a nucleotide linked to a detectable label, such as a chemical moiety that can be detected via fluorescence spectroscopy. As set forth in the claim, the incorporated nucleotide includes the

following features: (1) a base linked to a detectable label via a linker that can be cleaved, and (2) a protecting group that comprises an azido group on the 2' or 3'-positions of the nucleotide. Some of the dependent claims at issue in this case further limit the structure of the nucleotide, as discussed in more detail below.

27. The asserted claims of the '200 patent provide much of the same features as the '537 patent and adds features related to detection and final sequence determination. Of the asserted claims, claims 1 and 11 are independent and provided in full below:

> 1. A method of labeling a nucleic acid molecule, the method comprising: incorporating into the nucleic acid molecule a nucleotide molecule using a polymerase, wherein the nucleotide molecule has a base that is linked to a fluorophore via a cleavable linker and the nucleotide molecule has a deoxyribose sugar moiety, wherein the deoxyribose sugar moiety comprises a protecting group attached via the 3′ oxygen atom, and said protecting group can be modified or removed to expose a 3′ OH group, the protecting group comprising an azido group.
>
> 11. A method of labeling a nucleic acid molecule, the method comprising: incorporating into the nucleic acid molecule a nucleotide molecule using a polymerase, wherein the nucleotide molecule has a base that is linked to a fluorophore via a cleavable linker and the nucleotide molecule has a deoxyribose sugar moiety, wherein the deoxyribose sugar moiety comprises a protecting group attached via the 3′ oxygen atom, and said protecting group can be modified or removed to expose a 3′ OH group, the protecting group comprising CH_2N_3.

Ex. C ('200 patent) at 20:56-67; 21:21-22:4.

28. Claim 1 of the '200 patent is nearly identical to, but narrower than, claim 1 of the '537 patent (discussed *supra*). The claims differ in that (a) where the '537 patent recites "incorporating into the nucleic acid molecule a nucleotide or nucleoside molecule", the '200 Patent recites "incorporating into the nucleic acid molecule a nucleotide molecule using a polymerase"; (b) where the '537 patent recites "wherein the nucleotide or nucleoside molecule has a base that is linked to a detectable label", the '200 Patent recites "wherein the nucleotide molecule has a base that is linked to a fluorophore"; (c) where the '537 patent recites "wherein the ribose or deoxyribose sugar moiety comprises a protecting group attached via the 2′ or 3′ oxygen atom", the '200 Patent recites "wherein the deoxyribose sugar moiety comprises a protecting group attached via the 3′ oxygen atom" (distinctions emphasized).

29. Independent claims 1 and 11 of the '200 patent are nearly identical except that where

claim 1 provides "the protecting group comprising an azido group," claim 11 provides "the protecting group comprising CH2N3". The dependent claims at issue in this case provide further limitations, as discussed below.

30. The method of determining the sequence of nucleic acid molecules as described in the Asserted Illumina Patents is used predominantly in a technique for DNA sequencing known as "sequencing-by-synthesis," also referred to as "SBS" for short. SBS is used in both Illumina's sequencing products and MGI's sequencing products, and so an overview of SBS is helpful background for my opinions in this matter.

31. DNA is a molecule made up of four chemical bases: adenine, guanine, cytosine, and thymine. Each of the bases in DNA is also attached to a sugar fragment and a phosphate fragment. The combination of the base, sugar, and phosphate molecule is called a nucleotide. The four nucleotides that make up DNA are: "A" for adenine, "G" for guanine, "C" for cytosine, and "T" for thymine. DNA consists of two paired strands of nucleotides that wind around one another to form a double helix. In forming the double helix, the nucleotides of one strand pair up with nucleotides of another strand in a specific, complementary way: A only pairs with T, and G only pairs with C.

32. In the type of SBS employed by Illumina and MGI[1], the DNA strand of interest (the "target strand" or "target DNA") is sequenced by synthesizing a complementary strand (the "complementary strand" or "growing strand"). This is done by sequentially incorporating detectable nucleotides into the growing strand, thereby revealing the identity of the nucleotides in the target strand through their complementary relationship. The target strand consists of just one strand of a DNA double helix. Each of the four different kinds of nucleotides used in a common form of SBS can be detected or otherwise identified in order to distinguish the different nucleotides. After a nucleotide is incorporated into the growing strand, the nucleotide is identified. Then, the next nucleotide is incorporated into the growing DNA strand, and the nucleotide is again identified.

[1] MGI refers to their sequencing technology as cPAS (combinatorial Probe Anchor Synthesis) sequencing technology. Because this is not distinct from SBS, I will refer to this chemistry as SBS throughout this declaration.

By repeatedly incorporating and identifying nucleotides, the DNA sequence of the target strand can be determined. Below, I describe how this type of SBS is used in the Illumina sequencing products so as to illustrate this process in further detail.

33. Illumina's sequencing process starts by hybridizing a "sequencing primer" to the target strand, the former of which is attached to a solid surface. By attaching the target strand to a surface, the target strand will stay at a fixed position throughout the sequencing process and can, thus, be more easily identified. In the following illustration, the target strand is represented by the purple/green strand, and the primer is represented by the blue circles without letters.

34. The next step is to add a single nucleotide to the primer, typically by using an enzyme that can catalyze the incorporation of a nucleotide into the complimentary strand. One example of such an enzyme is the DNA polymerase enzyme. The nucleotide that gets added depends on the sequence of the next base in the target strand. If the next nucleotide in the target is A, then a T will be added to the primer; if the next nucleotide is T, then A will be added; if the next nucleotide is G, then C will be added; if the next nucleotide is C, then G will be added. In the illustration above, the first nucleotide in the target strand is an A, so a T was added to the blue primer (i.e. the complementary strand).

35. Each of these added bases is blocked in a way that only permits one base to be added at a time. After the incorporation of each new nucleotide, the complementary strand is read using the detectable label and the single nucleotide type is detected. When that is done, Illumina removes the block and the detectable label from the added nucleotide, allowing a new nucleotide to be

added. Illumina then reads this new nucleotide.

36. Illumina's system repeats this process of adding a nucleotide, reading the detectable label, and removing the block for multiple rounds. In this way, Illumina's system reveals a sequence of nucleotides by monitoring the identity of each nucleotide incorporated into the complementary strand.

37. Illumina's system is massively parallel in that it sequences and records readings of multiple complementary strands during each round of SBS. Each complementary strand is located in a different area on the sequencing flow cell's surface. Thus, the sequence of nucleotides at each complementary strand can be deduced by looking at the reads at each spot in each round of SBS (each spot corresponding to a different DNA strand).

38. While the Asserted Illumina Patents are not limited to SBS, they are ideally suited to this type of SBS used by Illumina and MGI. It is easy to see why now. As I note above, the Asserted Illumina Patents are each directed to a method of determining the sequence of a nucleic acid. The SBS of the Illumina and MGI processes consists essentially of repeatedly incorporating detectable nucleotides and identifying those nucleotides. The nucleic acid molecule that is labeled is the DNA that is being sequenced. It is labeled by incorporating a nucleotide linked to a detectable label into the growing DNA strand. Below, I describe the individual parts of claim 1 of the '537 patent in the context of SBS as used by Illumina and MGI. Due to the similarities between claim 1 of the '537 patent and claim 1 of the '200 patent, the following discussion of claim 1 of the '537 patent applies to both of these patents.

39. First, the claim recites that the method of determining nucleic acid sequences comprises "incorporating" into a "nucleic acid molecule a nucleotide or nucleoside molecule." This is done when the modified nucleotide molecule is added to the complementary strand.

40. The claim further recites that the "nucleotide or nucleoside molecule has a base that is linked to a detectable label via a cleavable linker." In SBS, the nucleotides that are added to the complementary strand can include a label that can be detected. Claim 1 of the '537 patent requires that the label be attached to the nucleotide via a "linker" that can be cleaved. This allows one to remove the label from the nucleotide after the nucleotide has been added to the complementary

strand. By removing the label in this manner, its optical properties will not interfere with or obscure the signal that can be detected from the label on the next nucleotide that is added to the complementary strand.

41. The claim next recites that the "nucleotide or nucleoside molecule has a ribose or deoxyribose sugar moiety." As I explain above, nucleotide molecules, which are added to the growing DNA strand in SBS, must include a sugar fragment. This claim element limits the sugar to a ribose or deoxyribose sugar. Ribose differs from deoxyribose in that deoxyribose does not include an oxygen on the 2' oxygen atom.

42. The claim next recites that the "ribose or deoxyribose sugar moiety comprises a protecting group attached via the 2' or 3' oxygen atom." As the '537 patent explains, the "protecting group is intended to prevent nucleotide incorporation onto a nascent polynucleotide strand, and can be removed under defined conditions to allow polymerisation to occur." Ex. B ('537 patent) at 7:51-53. In other words, by having a "protecting group" in the nucleotide, the new nucleotide will be added to the complementary strand, and no additional nucleotides will be added. The nucleotide can then be identified without interference from another nucleotide.

43. Next, the claim recites that the "protecting group can be modified or removed to expose a 3' OH group." This claim element requires that the "protecting group" be of such a nature that it can be removed or modified in such a manner that the end result is a hydroxyl chemical group at the "3'" position of the sugar. A hydroxyl group at the 3' position reflects the natural state of the ribose or deoxyribose as found in nature. Only when the sugar is in its natural state with a hydroxyl group at the 3' position can another nucleotide be added to the growing DNA strand. By requiring "protecting groups" that "can be modified or removed to expose a 3' OH group," the claims thus allow one to control when a nucleotide is added to the growing DNA strand.

44. Finally, the claim recites that the "protecting group" include an "azido group." One advantage of such a group is that it can be removed under conditions consistent with those necessary for DNA sequencing processes, and yet it is not so bulky that it interferes with the action of the enzymes that are used in SBS.

V. THE LEVEL OF ORDINARY SKILL IN THE ART

45. My opinion on the level of ordinary skill in the art is based upon my personal knowledge and experience as well as my consideration of such things as the education and experience level of persons of skill working in the field.

46. In my opinion, the field of invention is DNA sequencing. One of skill in the art as of that date would have been a Ph.D. or equivalent in molecular biology or associated sciences, such as chemistry, or the equivalent education and experience. In addition, a person of ordinary skill in the art would have had over 5 years of laboratory experience.

VI. CLAIM CONSTRUCTION

47. There should not be significant disputes as to the meanings of the claim terms of the Asserted Illumina Patents because the claims are all composed of standard terms known to the skilled artisan. I have been informed that the below terms are disputed; however, for all but the second term, the Accused Products infringe the Identified Claims under either party's construction, as discussed below. With respect to the second term, I disagree that "said protecting group can be modified or removed to expose a 3' OH group" is indefinite, and thus, I have applied the plain and ordinary meaning of this term in my analysis.

Claim Term	Illumina's Position	MGI's Position
incorporating into the nucleic acid molecule '537: Claim 1 '200: Claim 1, 11	No construction necessary	using an enzyme to add, at the 3' end of the nucleic acid molecule
said protecting group can be modified or removed to expose a 3' OH group '537: Claim 1 '200: Claims 1 and 11	No construction necessary	Indefinite
comprises an azido group ('537: Claim 1) OR comprising an azido group ('200: Claim 1)	An azido group is a chemical moiety of the structure O – C(R4)(R5) – N3 where R4 Is H or alkyl and R5 is H or alkyl and 'alkyl' refers to groups having 1 to 8 carbon atoms	includes at least an azido group (i.e. a group of three nitrogen atoms covalently linked, represented as (—N3))

nucleoside '537: Claim 1	A 'nucleoside' is structurally similar to a nucleotide, but are missing the phosphate moieties. The term nucleoside encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule.	A 'nucleoside' consists of a nitrogenous base, a sugar, and there are no phosphate moieties attached to the sugar. The term nucleoside encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule.

48. Further, I understand that the specification contains definitions for many of the terms used in the claims and that the parties have agreed on certain constructions. For the purposes of this declaration, I have applied the following constructions:

Claim Term	**Agreed Construction**
nucleotide	"[A] 'nucleotide' consists of a nitrogenous base, a sugar, and one or more phosphate groups." Ex. B ('537 patent) at 4:48-49; Ex. C ('200 patent) at 5:4-5. The term nucleotide encompasses analogs and derivatives of nucleotides. Ex. B at 5:16-19; Ex. C at 5:43-45. A "derivative" or "analog" of a nucleotide means a compound or molecule whose core structure is the same as, or closely resembles that of, a nucleotide, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleotide to be linked to another molecule. Ex. B at 5:1-6; Ex. C at 5:26-31.
Claim Term	**Definition From the Asserted Illumina Patents**
nucleoside	"A 'nucleoside' is structurally similar to a nucleotide, but are missing the phosphate moieties." Ex. B at 4:59-60; Ex. C at 5:16-17. The term nucleoside encompasses analogs and derivatives of nucleosides. Ex. B at 5:16-19; Ex. C at 5:43-45. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule. Ex. B at 5:1-6; Ex. C at 5:26-31.

Protecting group	A chemical moiety that "can be removed to expose a 3′-OH group." Ex. B at 2:27-28; Ex. C at 2:63-54.

VII. INFRINGEMENT ANALYSIS

49. I understand that Illumina contends that the Accused Products infringe the Identified Claims, among others. Statements made by MGI's Chief Scientific Officer ("CSO") and published in a GenomeWeb article demonstrate that the Accused Products are used to conduct stepwise SBS. *See* Ex. D (MGI's "[…] current sequencing chemistry relies on stepwise sequencing-by-synthesis (SBS) where 3'-blocked nucleotides are labeled with cleavable fluorescent dyes, which leave a molecular 'scar' after they are removed."). The article also disclosed that "[t]his chemistry is similar to that used by Illumina and others." *Id.* [redacted] Based on my analysis, it is my opinion that the Accused Products infringe, at least, the Identified Claims.

50. I have considered the following documents regarding the MGI Accused Products:

(a) Karow J. MGI Prepares to Sell Sequencers in North America, Europe; Announces Proprietary Sequencing Chemistry. GenomeWeb, March 4, 2019 ("GenomeWeb article") (Exhibit D to this declaration);

(b) Defendants' Response to Plaintiffs' Expedited Discovery Requests (Exhibit E to this declaration).

51. Attached to this report as Appendices 1 and 2 are charts showing how each element of the Identified Claims is present in the Accused Products. Below, I explain how the Accused Products directly infringe these claims.

A. Direct Infringement of Claim 1 of the '537 Patent

1. "A method of labeling a nucleic acid molecule comprising incorporating into the nucleic acid molecule a nucleotide or nucleoside molecule"

52. To the extent the preamble is considered a claim limitation, the Accused Products perform a method of determining the sequence of a nucleic acid molecule by incorporating a detectable nucleotide or nucleoside into the nucleic acid. MGI's CSO was quoted in a GenomeWeb article as describing its sequencing chemistry in the following manner: "[…] current sequencing

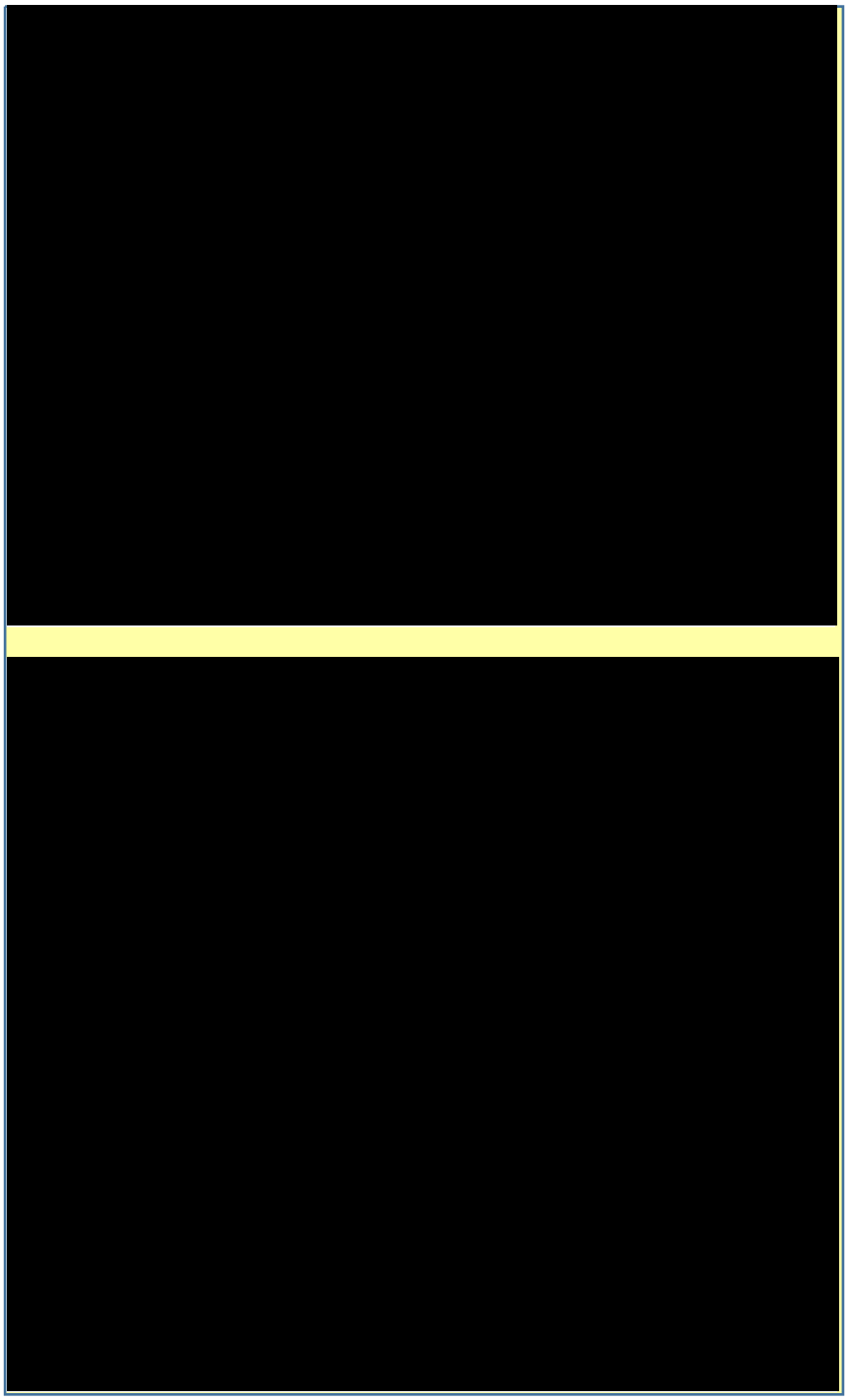
chemistry relies on stepwise sequencing-by-synthesis (SBS) where 3'-blocked nucleotides are labeled with cleavable fluorescent dyes, which leave a molecular 'scar' after they are removed." *See* Ex. D. The article then disclosed that "[t]his chemistry is similar to that used by Illumina and others." *Id*. As discussed in paragraphs 30-37 above, this type of incorporation necessarily occurs in Next Generation Sequencing using SBS.

2. "wherein the nucleotide or nucleoside molecule has a base that is linked to a detectable label via a cleavable linker"

53. As discussed above in paragraph 31, a nucleotide is a combination of a base, sugar and phosphate group. This limitation requires that the cleavable linker be attached to the base of the nucleotide. [redacted]

3. "the nucleotide or nucleoside molecule has a ribose or deoxyribose sugar moiety, wherein the ribose or deoxyribose sugar moiety comprises a protecting group attached via the 2' or 3' oxygen atom"

54. As explained above, a hydroxyl group at the 3' position reflects the natural state of the ribose or deoxyribose as found in nature. Only when the sugar is in its natural state with a hydroxyl group at the 3' position can another nucleotide be added to the growing DNA strand. Therefore, to determine the sequence of the DNA via stepwise SBS, the hydroxyl group must be blocked at each step, until the growing DNA strand is ready for a new nucleotide to be incorporated. Such blockage is achieved by a protecting group.



4. "said protecting group can be modified or removed to expose a 3' OH group"

55. MGI's CSO was quoted in a GenomeWeb article as describing its sequencing chemistry in the following manner: "[…] current sequencing chemistry relies on stepwise sequencing-by-synthesis (SBS) where 3'-blocked nucleotides are labeled with cleavable fluorescent dyes, which leave a molecular 'scar' after they are removed." *See* Ex. D. The article

then disclosed that "[t]his chemistry is similar to that used by Illumina and others." *Id.*

56. As explained above, a hydroxyl group at the 3' position reflects the natural state of the ribose or deoxyribose as found in nature. Only when the sugar is in its natural state with a hydroxyl group at the 3' position can another nucleotide be added to the growing DNA strand. Therefore, in order to determine the sequence of the DNA via stepwise SBS, the hydroxyl group must be blocked at each step, until the newly incorporated nucleotide is detected, and then removed or modified to allow a new nucleotide to be incorporated. This claim limitation, thus, speaks to an integral aspect of MGI's stated objective of stepwise SBS. [redacted]

5. "the protecting group comprises an azido group"

57. [redacted].

B. Direct Infringement of Claim 4 of the '537 Patent

58. Claim 3 requires that the base is a deazapurine.

C. Direct Infringement of Claim 4 of the '537 Patent

59. Claim 4 requires that each of the nucleotides be a deoxyribonucleotide triphosphate. This language requires (1) that the sugar in each nucleotide be a deoxyribose, and (2) that each nucleotide include a triphosphate.

D. Direct Infringement of Claim 5 of the '537 Patent

60. Claim 5 requires that the nucleotide include a "fluorophore." A fluorophore is a chemical moiety with the property that it rapidly re-emits light of a longer wavelength when it absorbs light of a shorter wavelength. In the Accused Products, the re-emitted light from the fluorophore is used to detect the type of nucleotide that has been added to the growing DNA strand during the SBS process. MGI's CSO was quoted in a GenomeWeb article as describing its sequencing chemistry in the following manner: "[…] current sequencing chemistry relies on stepwise sequencing-by-synthesis (SBS) where 3'-blocked nucleotides are labeled with cleavable fluorescent dyes, which leave a molecular 'scar' after they are removed." *See* Ex. D. The article then disclosed that "[t]his chemistry is similar to that used by Illumina and others." *Id.* [redacted]

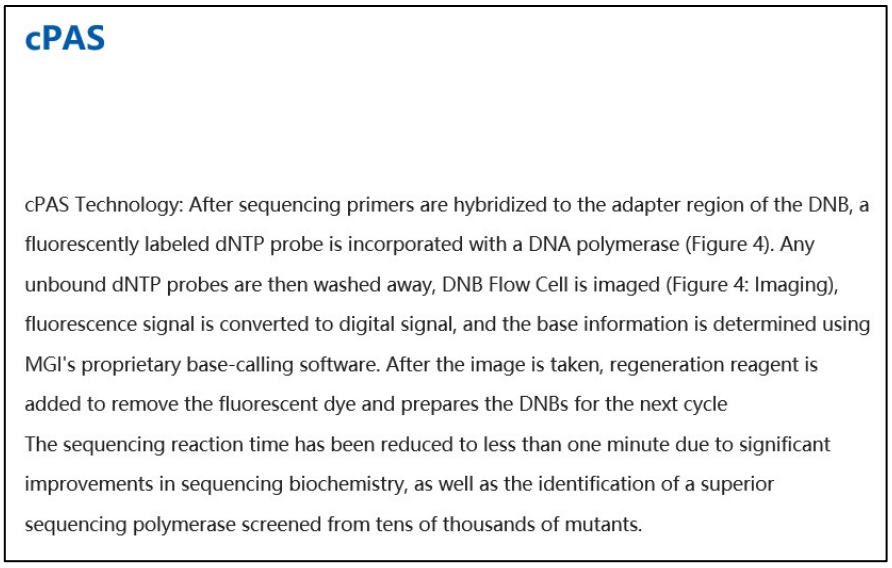
E. Direct Infringement of Claim 6 of the '537 Patent

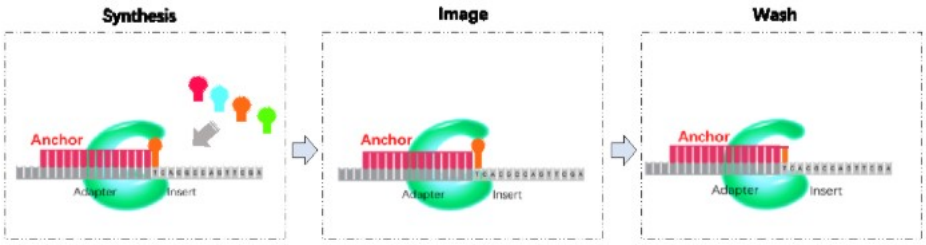
61. Claim 6 requires that the protecting group be CH_2N_3, which is commonly referred to as an "azidomethyl group." [redacted]

[redacted]. *See* Section VII.A.5.

F. Direct Infringement of Claim 8 of the '537 Patent

62. Claim 8 of the '537 patent requires "detecting the detectable label and cleaving the cleavable linker." MGI's CSO was quoted in a GenomeWeb article as stating that MGI's chemistry uses "nucleotides that are labeled with cleavable fluorescent dyes." *See* Ex. D. MGI's cleavable fluorescent dyes allow the complementary strand to be read after the incorporation of each new nucleotide such that the newly incorporated nucleotide can be individually detected. In order to determine the sequence of the target DNA, the Accused Products must detect or read the fluorescent dye label after incorporation of each individual nucleotide. Once detection of one nucleotide is complete, the cleavable linker (which contains the fluorescent dye) must be cleaved so that the next nucleotide can be incorporated and read. SBS requires such cleavage before incorporation of the next nucleotide; otherwise, the presence of the linker would compromise polymerase function by inhibiting the polymerase's ability to recognize the DNA, thereby prohibiting incorporation of the next nucleotide. Moreover, by removing the linker, its optical properties will not interfere with or obscure the signal that can be detected from the next nucleotide that is added to the complementary strand. MGI confirms this information on its website under the heading "INTRODUCTION TO MGI SEQUENCING TECHNOLOGY: cPAS." *See* https://en.mgitech.cn/products/.





G. Direct Infringement of Claim 1 of the '200 Patent

1. "A method of labeling a nucleic acid molecule comprising: incorporating into the nucleic acid molecule a nucleotide molecule using a polymerase"

63. This claim limitation is identical to the claim limitation discussed in section VII.A.1, except as discussed in paragraph 28. Thus, based on my discussion in section VII.A.1, it is my opinion that the Accused Products satisfy this claim limitation.

2. "wherein the nucleotide molecule has a base that is linked to a linked to a fluorophore via a cleavable linker"

64. This claim limitation is identical to the claim limitation discussed in section VII.A.2, except as discussed in paragraph 28. A fluorophore is a chemical moiety with the property that it rapidly re-emits light of a longer wavelength when it absorbs light of a shorter wavelength, thereby making it detectable. MGI's CSO was quoted in a GenomeWeb article as stating that MGI's chemistry uses "nucleotides that are labeled with cleavable fluorescent dyes." Ex. D. Taking this statement along with my discussion in section VII.A.2, it is my opinion that the Accused Products satisfy this claim limitation.

3. "the nucleotide molecule has a deoxyribose sugar moiety, wherein the ribose or deoxyribose sugar moiety comprises a protecting group attached via the 3' oxygen atom"

65. This claim limitation is identical to the claim limitation discussed in section VII.A.3, except as discussed in paragraph 28. Thus, based on my discussion in section VII.A.3, it is my opinion that the Accused Products satisfy this claim limitation.

4. "said protecting group can be modified or removed to expose a 3' OH group"

66. This claim limitation is identical to the claim limitation discussed in section VII.A.4. Thus, based on my discussion in section VII.A.4, it is my opinion that the Accused Products satisfy

this claim limitation.

5. "the protecting group comprises an azido group"

67. This claim limitation is identical to the claim limitation discussed in section VII.A.5. Thus, based on my discussion in section VII.A.5, it is my opinion that the Accused Products satisfy this claim limitation and, accordingly, infringe claim 1 of the '200 patent.

H. Direct Infringement of Claim 4 of the '200 Patent

68. This claim limitation is identical to the claim limitation discussed in section VII.B. Thus, based on my discussion in section VII.B, it is my opinion that the Accused Products satisfy this claim limitation.

I. Direct Infringement of Claim 5 of the '200 Patent

69. This claim limitation is identical to the claim limitation discussed in section VII.C. Thus, based on my discussion in section VII.C, it is my opinion that the Accused Products satisfy this claim limitation.

J. Direct Infringement of Claim 7 of the '200 Patent

70. This claim limitation is identical to the claim limitation discussed in section VII.E. Thus, based on my discussion in section VII.E, it is my opinion that the Accused Products satisfy this claim limitation.

K. Direct Infringement of Claim 8 of the '200 Patent

71. Claim 8 requires (1) "removing the protecting group and cleaving the cleavable linker" and (2) doing so "under identical conditions." [redacted]

L. Direct Infringement of Claim 9 of the '200 Patent

72. Claim 9 requires "detecting the fluorophore prior to the removing and cleaving step." As explained above, a hydroxyl group at the 3' position reflects the natural state of the ribose or deoxyribose as found in nature. Only when the sugar is in its natural state with a hydroxyl group

at the 3' position can another nucleotide be added to the growing DNA strand. Therefore, in order to determine the sequence of the DNA via stepwise SBS, the hydroxyl group must be blocked at each step, until the newly incorporated nucleotide is detected, and then removed or modified to allow a new nucleotide to be incorporated. Therefore, this claim limitation is satisfied by the natural process of SBS required to achieve MGI's stated objective of stepwise sequence determination. *See* Ex. D; *see also* section VII.F.

M. Direct Infringement of Claim 10 of the '200 Patent

73. Claim 10 requires "repeating the incorporating, detecting, and removing and cleaving steps at least once, thereby determining a nucleotide sequence". For the same reasons discussed above in sections F and J, this claim limitation is satisfied by the intended use of the Accused Products.

N. Direct Infringement of Claim 11 of the '200 Patent

74. Claim 11 is identical to claim 1 of the '200 patent, except as discussed in paragraph 29. The specificity of claim 11 is captured in dependent claim 7 of the '200 patent. Therefore, for the reasons discussed in section VII.H (and, thus, section VII.D), it is my opinion that the Accused Products satisfy this claim limitation and, accordingly, infringes independent claim 11.

O. Direct Infringement of Claim 14 of the '200 Patent

75. This claim limitation is identical to the claim limitation discussed in section VII.B. Thus, based on my discussion in section VII.J (and, thus, section VII.E), it is my opinion that the Accused Products satisfy this claim limitation.

P. Direct Infringement of Claim 15 of the '200 Patent

76. This claim limitation is identical to the claim limitation discussed in section VII.I. Thus, based on my discussion in section VII.I, it is my opinion that the Accused Products satisfy this claim limitation.

Q. Direct Infringement of Claim 17 of the '200 Patent

77. This claim limitation is identical to the claim limitation discussed in section VII.K. Thus, based on my discussion in section VII.K, it is my opinion that the Accused Products satisfy this claim limitation.

R. Direct Infringement of Claim 18 of the '200 Patent

78. This claim limitation is identical to the claim limitation discussed in section VII.L. Thus, based on my discussion in section VII.L, it is my opinion that the Accused Products satisfy this claim limitation.

S. Direct Infringement of Claim 19 of the '200 Patent

79. This claim limitation is identical to the claim limitation discussed in section VII.M. Thus, based on my discussion in section VII.M, it is my opinion that the Accused Products satisfy this claim limitation.

VIII. COMPENSATION

80. My compensation for consulting on this matter is $450 per hour. My compensation does not depend on the outcome of this dispute.

I confirm that the contents of this Declaration are true to the best of my knowledge and belief insofar as it states facts and that it contains my honest opinions on the matters upon which I have been asked to give them.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: February 19, 2020

Kevin Burgess

KEVIN BURGESS

DECLARATION OF SERVICE

I am a citizen of the United States, more than 18 years old, and not a party to this action. My place of employment and business address is 201 Redwood Shores Parkway, Redwood Shores, California 94065. On February 19, 2020, I caused a copy of:

DECLARATION OF KEVIN BURGESS IN SUPPORT OF ILLUMINA'S MOTION FOR PRELIMINARY INJUNCTION

To be served as follows:

[XX] BY ELECTRONIC SERVICE

I am readily familiar with the business practice at my place of business for electronically mailing a true and correct copy through Weil, Gotshal & Manges, LLP's electronic mail system to the e-mail address(es) set forth below, or as stated on the attached service list per agreement in accordance with Code of Civil Procedure section 1010.6

Executed on February 19, 2020 at Redwood Shores, California. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.